Amendments to the Claims:

This listing of claims will replace all prior version, and listings, of claims in the application.

Listing of Claims:

1 (Currently Amended) A method for obtaining an optimal reflectivity value for a complex multilayer stack~~s~~ implemented as a lithography simulation program executed on a computer, comprising:

(a) generating a model of a simulated multilayer stack prior to production of the multilayer stack and parameterizing each layer by providing parameters, the parameters including a thickness and an index of refraction;

(b) ~~allowing~~ receiving from a user ~~to~~ input values for the parameters, including ~~and to designate~~ a designation of an unrestricted number of the parameters as independent variables;

(c) calculating an extrema for a cost function of reflectivity R using the input parameter values;

(d) calculating sensitivity values S for the extrema; ~~and~~

(e) obtaining the optimal reflectivity value for the simulated multilayer stack by calculating a cost function $R + \alpha \cdot S$ using the ~~plurality of~~ independent variables at once, wherein α is a weighted parameter for the sensitivity values in the cost function; and

~~(e)~~(f) using the optimal reflectivity value to one of minimize and maximize reflectivity of at least one layer boundary in the multilayer stack to reduce resist critical dimension (CD) variation and improve accuracy of a lithography process.

2 (Canceled)

3 (Currently Amended) The method of claim 1 wherein the generating (a) further comprises: providing the model of the simulated multilayer stack with N layers, where a top layer comprises a top ambient resist layer followed by one or more layers of materials that are patterned over a substrate layer.

4 (Currently Amended) The method of claim ~~2~~3 wherein the generating (a) further comprises: providing the index of refraction to include a real and an imaginary number.

5 (Previously Presented) The method of claim 4 wherein the generating (a) further comprises: providing a j^{th} layer with thickness d_j, and a complex index of refraction $\mathbf{n}_j = n_j - i\,k_j$.

6 (Previously Presented) The method of claim 5 wherein the generating (a) further comprises: providing the ambient and substrate with complex indexes of refraction: $\mathbf{n}_0 = n_0 - i\,k_0$ and $\mathbf{n}_{N+1} = n_{N+1} - i\,k_{N+1}$, respectively.

7 (Previously Presented) The method of claim 6 wherein the generating (a) further comprises: defining reflectivity at an interface between two layers as a cost function, wherein the reflectivity R_j at a j^{th} interface (between the $(j-1)^{th}$ and j^{th} layers) is a function of $3(N-j+1)+4$ parameters, which are ; $n_{j-1}, n_j \ldots n_N, n_{N+1}; k_{j-1}, k_j \ldots k_N, k_{N+1}; d_j, d_{j+1} \ldots d_N$.

8 (Currently Amended) The method of claim 1 wherein ~~the allowing~~ (b) further comprises: ~~allowing~~ receiving from the user ~~to enter~~ values for the thickness and the complex indexes of refraction (n and k) for each layer, including a current starting point, a minimum value,

and a maximum value for the thickness and the complex indexes of refraction for each layer.

9 (Currently Amended) The method of claim 8 wherein ~~the allowing~~ (b) further comprises: ~~allowing~~ receiving from the user ~~to enter~~ step values for the parameters designated as independent variables, wherein those parameters that are not designated as independent variables are fixed.

10 (Previously Presented) The method of claim 1 wherein the obtaining (e) further comprises: defining the sensitivity as $S = (\text{Max } R - \text{Min } R)$ for all varied parameters.

11 (Currently Amended) A computer-readable medium containing program instructions for obtaining an optimal reflectivity value for a complex multilayer stack~~s~~ implemented as a lithography simulation program for execution on a computer, the instructions for:

(a) generating a model of a simulated multilayer stack prior to production of the multilayer stack and parameterizing each layer by providing parameters, the parameters including a thickness and an index of refraction;

(b) ~~allowing~~ receiving from a user ~~to~~ input values for the parameters, including a designation of ~~and to designate~~ an unrestricted number of parameters as independent variables;

(c) calculating an extrema for a cost function of reflectivity R using the input parameter values;

(d) calculating sensitivity values S for the extrema~~-~~; ~~and~~

(e) obtaining the optimal reflectivity value for the simulated multilayer stack by calculating a cost function $R + \alpha \cdot S$ using the ~~plurality of~~ independent variables at

once, wherein α is a weighted parameter for the sensitivity values in the cost function; and

~~(e)~~(f) using the optimal reflectivity value to one of minimize and maximize reflectivity of at least one layer boundary in the multilayer stack to reduce resist critical dimension (CD) variation and improve accuracy of a lithography process.

12 (Canceled)

13 (Currently Amended) The computer-readable medium of claim 11 wherein instruction (a) further comprises: providing the model of the multilayer stack with N layers, where a top layer comprises a top ambient resist layer followed by one or more layers of materials that are patterned over a substrate layer.

14 (Previously Presented) The computer-readable medium of claim 13 wherein instruction (a) further comprises: providing the index of refraction to include a real and an imaginary number.

15 (Previously Presented) The computer-readable medium of claim 14 wherein instruction (a) further comprises: providing a j^{th} layer with thickness d_j, and a complex index of refraction $\mathbf{n}_j = n_j - i\,k_j$.

16 (Previously Presented) The computer-readable medium of claim 15 wherein instruction (a) further comprises: providing the ambient and substrate with complex indexes of refraction: $\mathbf{n}_0 = n_0 - i\,k_0$ and $\mathbf{n}_{N+1} = n_{N+1} - i\,k_{N+1}$, respectively.

17 (Previously Presented) The computer-readable medium of claim 16 wherein instruction (a) further comprises: defining reflectivity at an interface between two layers as a cost function, wherein the reflectivity R_j at a j^{th} interface (between the $(j-1)^{th}$ and j^{th} layers) is a

function of $3(N - j + 1) + 4$ parameters, which are ; n_{j-1}, n_j … n_N, n_{N+1}; k_{j-1}, k_j … k_N, k_{N+1}; d_j, d_{j+1} … d_N.

18 (Currently Amended) The computer-readable medium of claim 11 wherein instruction (b) further comprises: ~~allowing~~ receiving from the user ~~to enter~~ values for the thickness and the complex indexes of refraction (*n* and *k*) for each layer, including a current starting point, a minimum value, and a maximum value for the thickness and the complex indexes of refraction for each layer.

19 (Currently Amended) The computer-readable medium of claim 18 wherein instruction (b) further comprises: ~~allowing~~ receiving from the user ~~to enter~~ step values for the parameters designated as independent variables, wherein those parameters that are not designated as independent variables are fixed.

20 (Previously Presented) The computer-readable medium of claim 11 wherein instruction (e) further comprises: defining the sensitivity as S = (Max R – Min R) for all varied parameters.